

ESSAAC Technology Subcommittee Observations and Recommendations November 5, 2003

The ESSAAC Technology Subcommittee (TSC) met in open session on November 5, 2003 at the Holiday Inn on the Hill in Washington, D.C. At the conclusion of a full day of presentations and discussions focused primarily on NASA's laser technology development program and how it relates to science objectives and instrument requirements, the committee generated the following set of observations and recommendations:

General:

1. As with many of NASA's technology programs, there is a struggle to balance the following sets of considerations:
 - Maintaining balance between supporting core competencies within the agency *versus* investing in out-of-house technology developments in industry and academia.
 - Maintaining balance in technology portfolios *versus* integrating technologies developed by other agencies.
 - Maintaining balance between industry state of the art (SOA) and state of practice (SOP) *versus* university and other government laboratories SOA and SOP.

TSC is not aware of the process by which NASA manages to balance the above considerations or, if such a process exists. Hence, TSC requests a briefing from ESTO on this topic at the next TSC meeting.

2. NASA's technology program can greatly benefit from similar technology investments made by DOD and industry. To that end, NASA needs to form closer connections with relevant federal laboratories and with industrial labs funded by DOD.

Laser Program

3. ESE's emphasis on active sensors, including lidars, as a major tool in the next generation of remote sensing instruments is well placed and should be accelerated. However, meeting all of the science needs in laser altimetry, wind measurements, CO₂, and ozone mapping will require a technology development program funded at substantially higher levels than current NASA laser development activities. ESE should either narrow down the scope of the applications it wishes to support or increase the funding for technology development.
4. NASA should take a systems view when setting requirements for lidar by including optics, detectors and laser transmitters in the overall analysis. A

similar trade-off should be considered between the use of expensive, data-intensive pulse digitization versus microlaser high PRF technology.

5. Review of The Laser Risk Reduction Program (LRRP) has raised a number of questions, including:

- Despite the fact that hundreds of millions of dollars of laser-based sensors are at risk (CALIPSO, ICESat, etc.) LRRP does not appear to have made significant progress towards reducing the risk of laser failure, does not have clearly defined objectives and deliverables, and has little awareness of similar DOD programs and investments.
- Although the LRRP program has a stated budget of \$9 million, judging by the reported results, it appears that only a small fraction of that amount has been spent on risk reduction studies.
- Is testing being done in realistic environments and configurations?
- GSFC is building a 1-micron laser. It is not clear how it will be significantly different from other currently available 1-micron lasers.

It is recommended that NASA conduct a thorough evaluation of the program based on progress realized thus far toward improving laser reliability. NASA should consider focusing the effort on diagnostics and realistic validation of laser modules, or returning the funds to the IIP and establishing LRRP as a part of IIP.

6. Greater attention should be paid to the data aspects of the various laser technologies to insure its optimal use by the science community.